[0012] **FIG. 3** is an exploded perspective view of a prior art registration system employing backlighting techniques;

[0013] **FIG. 4** is a perspective view of a laser pattern generator system fabricated in accordance with one embodiment of the present invention;

[0014] **FIG. 5** is a plan view showing, in detail, the optical components of the laser pattern generator shown above in **FIG. 4**;

[0015] **FIG. 6** is a detailed plan view of a workpiece, having photo-sensitive material and mylar thereon, disposed on a platen, shown above in **FIG. 4**;

[0016] **FIG. 7** is a magnified top-down view showing a fiducial, discussed above with respect to **FIG. 5**, illuminated employing top-down-dark-field illumination;

[0017] **FIG. 8** is a magnified top-down view showing a fiducial, discussed above with respect to **FIG. 5**, illuminated employing top-down-bright-field illumination;

[0018] **FIG. 9** is a detailed plan view of the workpiece, shown above in **FIG. 6**, employing backlighting in accordance with one embodiment of the present invention;

[0019] **FIG. 10** is a detailed plan view of the workpiece, shown above in **FIG. 9**, having photo-sensitive material and mylar on both sides thereof;

[0020] **FIG. 11** is a top-down view of the platen shown above in **FIG. 4**;

[0021] **FIG. 12** is a cross-sectional view of a platen, shown above in **FIG. 11**, in accordance with one embodiment of the present invention;

[0022] **FIG. 13** is a cross-sectional view of a platen shown above in **FIG. 11**, in accordance with a first alternate embodiment of the present invention;

[0023] **FIG. 14** is a cross-sectional view of a platen shown above in **FIG. 11**, in accordance with a second alternate embodiment of the present invention; and

[0024] **FIG. 15** is a flow diagram showing a method of determining alignment of a workpiece, with respect to a tool, in accordance with one embodiment of the present invention.

DESCRIPTION OF THE SPECIFIC EMBODIMENTS

[0025] Referring to **FIG. 4 a** perspective view of a laser pattern generator system **21** fabricated in accordance with one embodiment of the present invention is shown. System **21** is suitable for generating patterns on a photosensitive layer, referred to as a workpiece **22**, employing a beam source, referred to as a tool **24**. To that end, system **21** includes a frame **26** to which a stage **28** is coupled. A platen **25** is disposed on stage **28**, and workpiece **22** lies upon platen **25**. Stage **28** is moveably attached to frame **26** to reciprocate in three directions, x, y and z, and rotate about the z direction. To that end, a first servo-mechanism **30**, in data communication with a processor **34**, is coupled to stage **28** to facilitate movement along the x direction. A second servo-mechanism **36**, in data communication with processor **34**, is coupled to stage **28** to facilitate movement in the y direction. A third servo mechanism **38**, in data communication with processor **34**, is coupled to stage **28** to facilitate movement in the z direction, as well as rotation about the z direction. Movement of stage **28** is achieved under control of processor **34**. Platen **25** includes a plurality of vacuum grooves, one of which is shown as **27**. Vacuum grooves **27** are in fluid communication with a vacuum system **29** and ensure that workpiece **22** is held flat against platen **25**.

[0026] A boom **42** is coupled to frame **26** and extends parallel to the x direction. A laser **44** is in optical communication with tool **24**. Under control of processor **34**, laser **44** outputs a beam (not shown) that impinges upon workpiece **22** to form a pattern thereon. Movement between workpiece **22** and tool **24** is achieved by activating first and second servo-mechanisms **30** and **38** to translate stage **28** along the x and y directions, as discussed above. This allows the beam (not shown) to impinge upon any area of workpiece **24** as desired.

[0027] Referring to **FIG. 5**, laser **44** provides a radiant energy beam **46** for system **21** and is, for example, typically a five Watt, Argon-ion laser operating over a range of wavelengths of 351-385 nanometers. A pick-off mirror (not shown) directs beam **46** into a laser relay **48**, causing beam **46** to impinge upon an automatic beam steering apparatus **50** (ABS). ABS apparatus **50** corrects for spatial drift in beam due, for example, to thermal fluctuations in laser **44**, which ensures proper alignment of beam **46**. This reduces the need to control the temperature of laser **44**. This, in turn, reduces the need to perform manual alignment of beam **46**. A multi-channel modulator **52** (MCM) is positioned after ABS **50**. MCM **52** includes a beam splitter **54** and an Acousto-Optical Modulator **56** (AOM). Beam splitter **54** segments beam **46** into a plurality of beams, forming a beam brush **58**. AOM **56** modulates the intensity of the beams associated with brush **58**, as desired under control of a data path **60**. To that end, data path **60** comprises a dedicated processor that operates on computer readable code to regulate the AOM operational parameters.

[0028] After exiting MCM **52**, brush **58** passes through a scan lens system **62** that includes, for example, a rotating polygonal mirror **64**, as well as pre-polygonal optics **66** and post-polygonal optics **68**. Pre-polygonal optics **66** causes the beams of brush **58** to converge to a spot onto rotating polygonal mirror **64**. Rotating polygon mirror **64** has a plurality of facets and causes brush **58** to scan workpiece **22** along a scan axis. One embodiment of the present invention employs a scan axis that extends parallel to the x direction and is approximately six inches in length. However, the scan axis may be of any length and any direction desired. For example, the scan axis may extend across the entire width of workpiece **22** along the x direction. In the present example, for a given pattern the rotating polygonal mirror rotates at a constant rate, but may be varied to match stage **28** velocity.

[0029] The beams reflected from polygonal mirror **64** then pass through post-polygonal optics **68** directing the same into relay **70**. The beams exiting relay **70** scan workpiece **22**. Specifically, to form an image on workpiece **22**, workpiece **22** is scanned as stage **28** moves in the y direction, and the beam scans along the scan axis. This results in a plurality of scans, each of which is six inches in length. Each of the scans is displaced from an adjacent scan along the y direction. Thereafter, stage **28** moves in the x direction in preparation for another sequence of scans, each of which occurs in the scan axis, while stage **28** moves along y